

### General Description

SY6883 integrates an extremely low  $R_{DS(ON)}$  N-channel MOSFET with precise over-voltage protection to against high-voltage faults up to 25V. Linear mode is active to maintain the output voltage at 5.5V with the input voltage up to the input over-voltage threshold. SY6883 has programmable over-voltage threshold using two external resistors. The internal NFET is turned off to disconnect input and output when  $V_{IN}$  is higher than the over-voltage threshold. Low  $R_{DS(ON)}$  of the integrated switch helps to reduce power loss during the normal operation.

Control the /EN pin to enable or disable the device and /FLB indicates OVP and OTP.

### Features

- Low  $R_{DS(ON)}$  for the N-channel MOSFET Switch: 100 m $\Omega$  typical
- 2.0A Maximum Continuous Current
- Over-Voltage Protection up to 25V External Programmable Over-Voltage Protection Threshold
- Thermal Shutdown Protection& Auto Recovery
- OVP and OTP Fault Flag
- 300 $\mu$ A Maximum Quiescent Current
- 20 $\mu$ A Maximum in shutdown Current
- RoHS Compliant and Halogen Free
- Compact package: SOT23-6

### Ordering Information

SY6883 □(□□)□  
 □ Temperature Code  
 □ Package Code  
 □ Optional Spec Code

Ordering Number	Package type	Note
SY6883ABC	SOT23-6	----

### Applications

- Cell Phones
- Digital Still cameras
- GPS
- MP3 Players
- Personal Data Assistants(PDAs)
- USB Hot Swap/Live Insertion Device

### Typical Applications

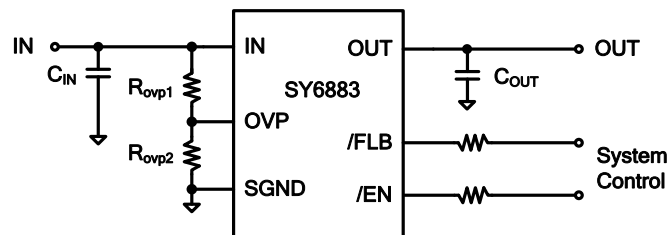
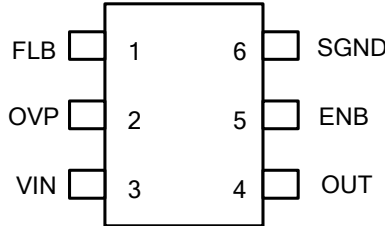


Figure 1. SY6883 Schematic Diagram

**Pinout (top view)**



Top mark: **RPxyz** (Device code: RP, *x*=year code, *y*=week code, *z*=lot number code)

Pin Name	Pin Number	Pin Description
VIN	3	Power input pin. Decouple high frequency noise by connecting at least 1uF MLCC to ground.
SGND	6	Signal ground pin.
OVP	2	Over voltage protection program pin. Using external divider to program OVP threshold. $V_{OVP}=1.2*(1+R_{OVP1}/R_{OVP2})$
FLB	1	Open drain device. Fault flag pin for OVP and OTP.
ENB	5	Active-low enable interface pin. It can be used to enable the output of the device by pulling the pin to ground, or disable the IC by pulling high.
OUT	4	Power output pin. Decouple high frequency noise by connecting at least 1uF MLCC to ground.

**Absolute Maximum Ratings** (Note 1)

Input Voltage ( $V_{IN}$ )	-0.3 to 25V
Output Voltage ( $V_{OUT}$ )	$0.3+V_{IN}$
All other pins	-0.3 to 6.5V
Maximum Continuous Switch Current	2.0A
Power Dissipation, $P_D$ @ $T_A = 25^\circ\text{C}$ , SOT23-6	0.6W
Package Thermal Resistance (Note 2)	
SOT23-6, $\theta_{JA}$	170°C/W
SOT23-6, $\theta_{JC}$	130°C/W
Junction Temperature Range	125°C
Lead Temperature (Soldering, 10 sec.)	260°C
Storage Temperature Range	-65°C to 150°C

**Recommended Operating Conditions** (Note 3)

Input Voltage ( $V_{IN}$ )	-0.3 to 23V
Junction Temperature Range	-40°C to 125°C
Ambient Temperature Range	-40°C to 85°C



## Electrical Characteristics

( $V_{IN} = 5V$ ,  $C_{IN} = 10\mu F$ ,  $C_{OUT} = 10\mu F$ ,  $T_A = 25^\circ C$ , unless otherwise specified)

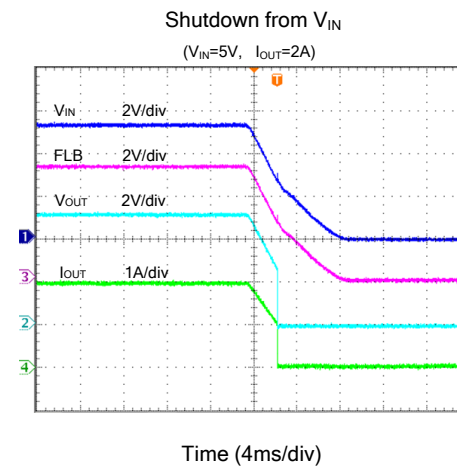
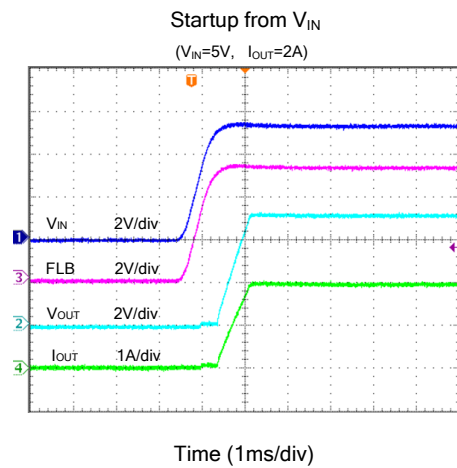
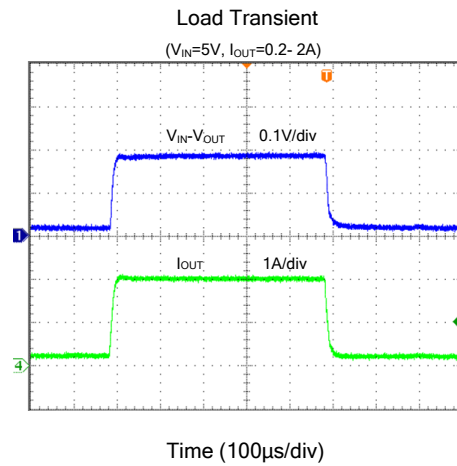
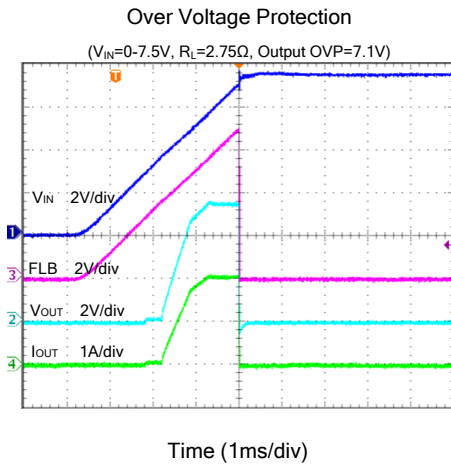
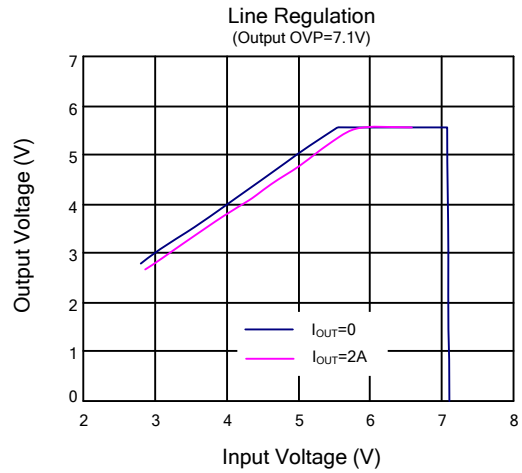
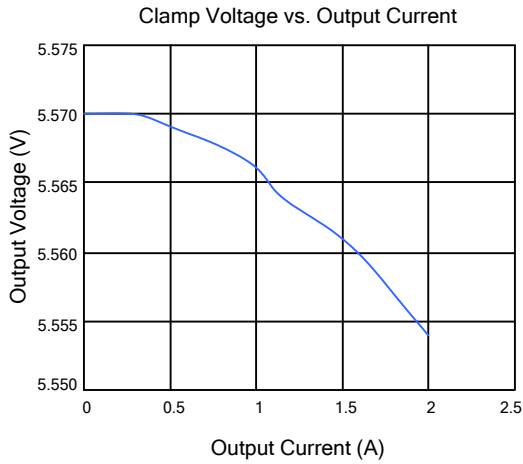
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>INPUT</b>						
Input Voltage Range	$V_{IN}$		3		23	V
Input UVLO Threshold	$V_{UVLO}$	Rising edge			3	V
UVLO hysteresis	$V_{UVLOHYS}$			0.1		V
Quiescent Current	$I_Q$	$I_{OUT}=0A$ , $/EN=0V$			300	$\mu A$
Shutdown Current	$I_{SHDN}$	$/EN=5V$ , $V_{OUT}=0V$			20	$\mu A$
<b>Protection FET</b>						
Protection NFET $R_{ON}$	$R_{DS(ON)}$	$I_{OUT}=100mA$		100		$m\Omega$
Off Leakage Current	$I_{LK}$	$/EN=High$ , $V_{IN}=5V$			1	$\mu A$
Output Over Current Protection			2.5			A
<b>Over-voltage Protection</b>						
Output Voltage Regulation	$V_{O(REG)}$	$/EN=LOW$ , $V_{IN}=6$ , OVP not active	5.23	5.50	5.78	V
OVP Threshold	$V_{OVP}$	Rising edge	1.14	1.2	1.26	V
OVP Threshold Hysteresis	$V_{OVPHYS}$			20		mV
<b>Enable and Fault Indicator Logic</b>						
$/EN$ Low Threshold	$V_{EN\_ON}$				0.4	V
$/EN$ High Threshold	$V_{EN\_OFF}$		1.6			V
$/FLB$ Output voltage low	$V_{FLB\_L}$				0.4	V
<b>Thermal Protection</b>						
Thermal Shutdown Temperature	$T_{SD}$			150		$^\circ C$
Thermal Shutdown Hysteresis	$T_{HYS}$			20		$^\circ C$

**Note 1:** Stresses beyond the “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**Note 2:**  $\theta_{JA}$  is measured in the natural convection at  $T_A = 25^\circ C$  on a low effective four-layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

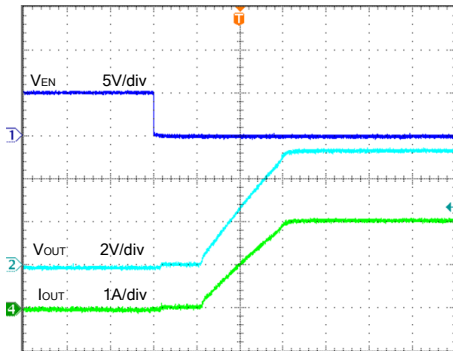
**Note 3:** The device is not guaranteed to function outside its operating conditions

## Typical Performance Characteristics



Startup from ENable

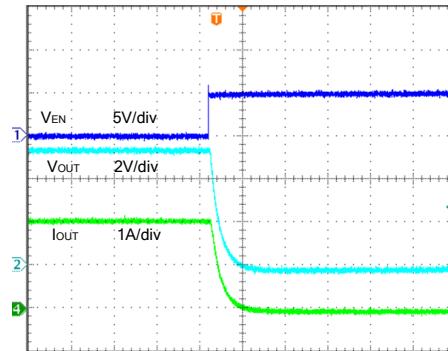
( $V_{IN}=5V$ ,  $I_{OUT}=2A$ )



Time (400µs/div)

Shutdown from ENable

( $V_{IN}=5V$ ,  $I_{OUT}=2A$ )



Time (10µs/div)

## Detail Function Description

SY6883 integrates an extremely low  $R_{DS(ON)}$  N-channel MOSFET with precise over-voltage protection to against high-voltage faults up to 25V. Linear mode is active to maintain the output voltage at 5.5V with the input voltage up to the input over-voltage threshold.

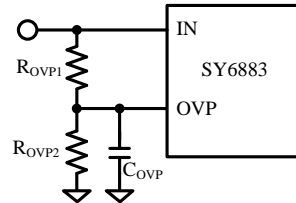
SY6883 has the programmable over-voltage threshold by two external resistors. The internal NFET will be turned off to disconnect input and output when the  $V_{IN}$  is higher than the over-voltage threshold. Low  $R_{DS(ON)}$  of the integrated switch helps to reduce power loss during the normal operation. Thermal protection is active to turn the NFET off if the die temperature exceeds 150°C.

### Input Under/Over-voltage Protection

The SY6883 starts work when the input voltage exceeds the UVLO threshold. The integrated NFET's gate is charged by an internal current source to control the output voltage's ramp up slewrate without any overshoot. While the input voltage is less than the output voltage regulation threshold  $V_{O(REG)}$  and above the UVLO threshold, the output voltage tracks the input voltage. When the input voltage is higher than the  $V_{O(REG)}$  and less than the over voltage protection threshold  $V_{OVP}$ , the integrated NFET is operated in LDO mode and regulates the output voltage at 5.5V. If the input voltage is higher than  $V_{OVP}$ , the overvoltage protection is active to turn the NFET off. The NFET is turned on when the input voltage falls back below  $(V_{OVP}-V_{OVPHYS})$  SY6883 has the programmable over-voltage threshold by two external resistors. The /FLB output is asserted when the overvoltage protection is active.

$$V_{OVP}=1.2*(1+R_{OVP1}/R_{OVP2})$$

Tie a small cap from OVP pin to ground to avoid OVP glitch by noise, especially in ESD test condition.



### Thermal Protection

If the die temperature of the device exceeds the thermal protection threshold which is typically 150°C, the NFET is turned off and the /FLB output is asserted low. The NFET is turned on when the die temperature falls to the recovery point.

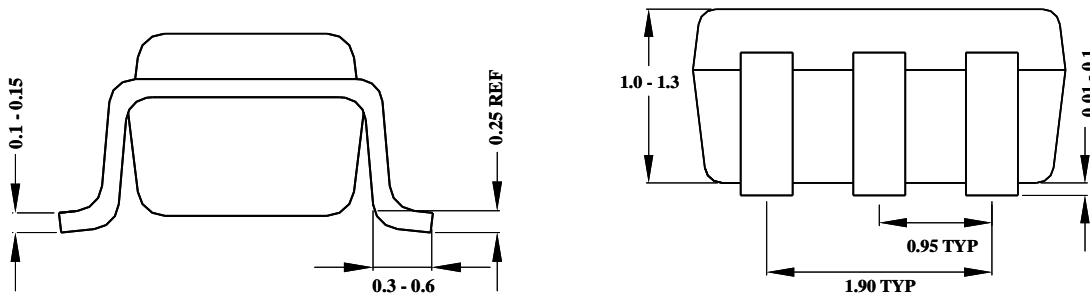
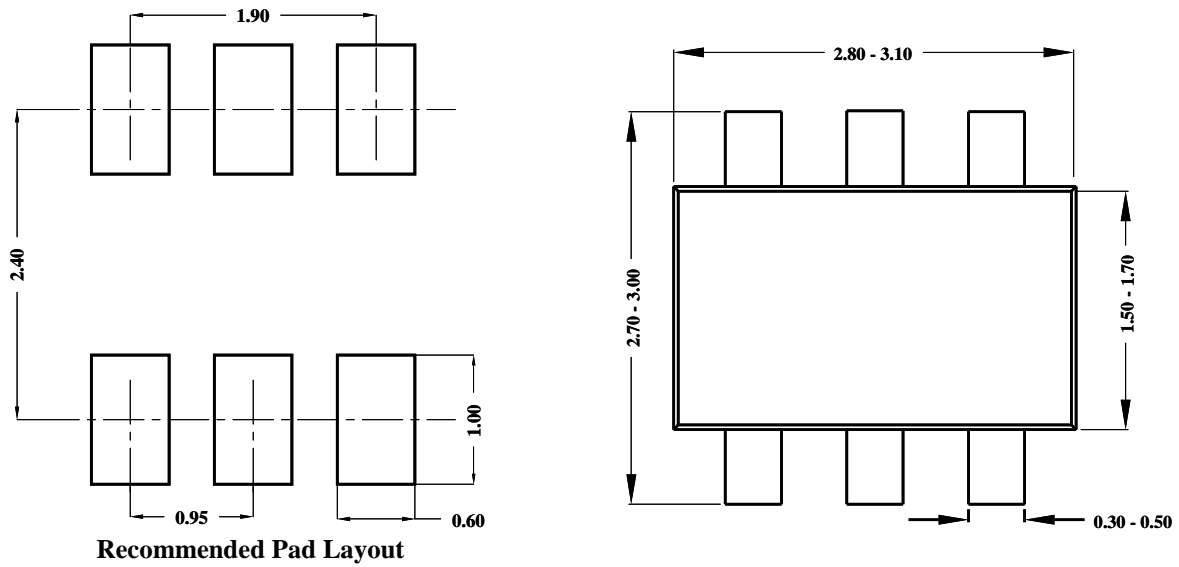
### Enable Function

SY6883 has the enable pin /EN that can be used to enable or disable the device. Pull down the /EN pin to enable the device and turn on the NFET if there's no any protection occurring. Pull up the /EN pin to disable the device and the NFET is turned off.

### Fault Indication

The /FLB pin is an active-low, open drain output. It is high impedance when there's no protection occurring or the device is disable by pulling up the /EN pin. When /EN is low, the /FLB pin goes low whenever overvoltage protection or thermal protection occurs.

**SOT23-6 Package outline & PCB layout design**



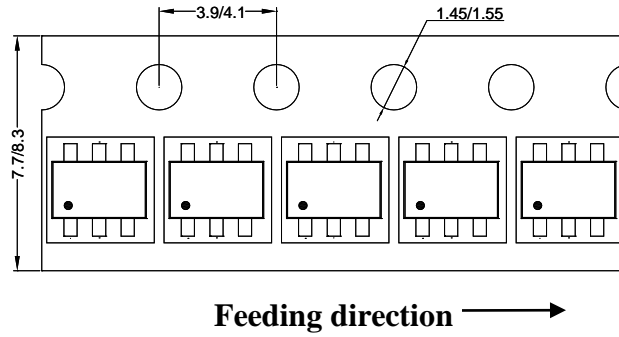
**Notes: All dimensions are in millimeters.**

**All dimensions don't include mold flash & metal burr.**

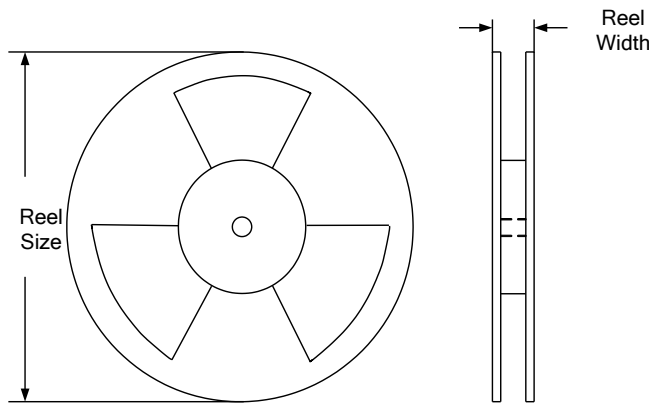
## Taping & Reel Specification

### 1. Taping orientation

SOT23-6



### 2. Carrier Tape & Reel specification for packages



Package types	Tape width (mm)	Pocket pitch(mm)	Reel size (Inch)	Reel width(mm)	Trailer length(mm)	Leader length (mm)	Qty per reel
SOT23-6	8	4	7"	8.4	280	160	3000

### 3. Others: NA



---

**IMPORTANT NOTICE**

1. **Right to make changes.** Silergy and its subsidiaries (hereafter Silergy) reserve the right to change any information published in this document, including but not limited to circuitry, specification and/or product design, manufacturing or descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products are sold subject to Silergy's standard terms and conditions of sale.
2. **Applications.** Application examples that are described herein for any of these products are for illustrative purposes only. Silergy makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification. Buyers are responsible for the design and operation of their applications and products using Silergy products. Silergy or its subsidiaries assume no liability for any application assistance or designs of customer products. It is customer's sole responsibility to determine whether the Silergy product is suitable and fit for the customer's applications and products planned. To minimize the risks associated with customer's products and applications, customer should provide adequate design and operating safeguards. Customer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Silergy assumes no liability related to any default, damage, costs or problem in the customer's applications or products, or the application or use by customer's third-party buyers. Customer will fully indemnify Silergy, its subsidiaries, and their representatives against any damages arising out of the use of any Silergy components in safety-critical applications. It is also buyers' sole responsibility to warrant and guarantee that any intellectual property rights of a third party are not infringed upon when integrating Silergy products into any application. Silergy assumes no responsibility for any said applications or for any use of any circuitry other than circuitry entirely embodied in a Silergy product.
3. **Limited warranty and liability.** Information furnished by Silergy in this document is believed to be accurate and reliable. However, Silergy makes no representation or warranty, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. In no event shall Silergy be liable for any indirect, incidental, punitive, special or consequential damages, including but not limited to lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges, whether or not such damages are based on tort or negligence, warranty, breach of contract or any other legal theory. Notwithstanding any damages that customer might incur for any reason whatsoever, Silergy' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Standard Terms and Conditions of Sale of Silergy.
4. **Suitability for use.** Customer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of Silergy components in its applications, notwithstanding any applications-related information or support that may be provided by Silergy. Silergy products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Silergy product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Silergy assumes no liability for inclusion and/or use of Silergy products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.
5. **Terms and conditions of commercial sale.** Silergy products are sold subject to the standard terms and conditions of commercial sale, as published at <http://www.silergy.com/stdterms>, unless otherwise agreed in a valid written individual agreement specifically agreed to in writing by an authorized officer of Silergy. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Silergy hereby expressly objects to and denies the application of any customer's general terms and conditions with regard to the purchase of Silergy products by the customer.
6. **No offer to sell or license.** Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights. Silergy makes no representation or warranty that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right. Information published by Silergy regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from Silergy under the patents or other intellectual property of Silergy.

For more information, please visit: [www.silergy.com](http://www.silergy.com)

© 2018 Silergy Corp.

**All Rights Reserved.**